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Express Mail No.: EL 501 638 257 US

FORM PTO-1390
(REV. 11-94)

MAR 3 0 2001

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER
10806-007 09/806782

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

JC07 Rec'd PCT/PTO 30 MAR 2001

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/SE99/01798	October 7, 1999	October 7, 1998

TITLE OF INVENTION
APPARATUS FOR ROUTING ASYNCHRONOUS TRAFFIC IN A CIRCUIT SWITCHED NETWORK

APPLICANT(S) FOR DO/EO/US
Per Lindgren, Christer Bohm, and Bengt Olsson

Applicant herewith submits to the United States Designated/ Elected Office (DO/EO/US) the following items under 35 U.S.C. 371:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.

2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.

3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).

4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☐ is transmitted herewith (required only if not transmitted by the international Bureau).
   b. ☒ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)

6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).

7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureaus.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.

8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 37(c)(3)).

9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). (unexecuted)

10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.

12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

13. ☐ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

14. ☐ A substitute specification.

15. ☐ A change of power of attorney and/or address letter.

16. ☐ Other items or information:

INTERNATIONAL APPLICATION NO. PCT/SE99/01799	09/806782	INTERNATIONAL FILING DATE October 7, 1999	JC08 Rec'd PCT/PTO 30 MAR

17. ☒ The U.S. National Fee (35 U.S.C. 371(c)(1)) and other fees as follows:

CLAIMS				
(1)FOR	(2)NUMBER FILED	(3)NUMBER EXTRA	(4)RATE	(5)CALCULATIONS
TOTAL CLAIMS	16 - 20	0	X $ 18.00	$ 0.00
INDEPENDENT CLAIMS	1 - 3	0	X $ 80.00	0.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ $ 270.00	$ 270.00

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): **CHECK ONE BOX ONLY** ☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) . . . . . $ 690		
☐ No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) . . . . . $ 710		
☒ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO $1000	$	1,000.00
☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2) to (4) . . . . . $ 100		
☐ Filing with EPO or JPO search report . . . . . $ 860		
Surcharge of $130.00 for furnishing the National fee or oath or declaration later than 20 30 mos. from the earliest claimed priority date (37 CFR 1.492(e)).		
TOTAL OF ABOVE CALCULATIONS	=	1,270.00
Reduction by 1/2 for filing by small entity, if applicable. Affidavit must be filed also. (Note 37 CFR 1.9, 1.27, 1.28).	- $	635.00
SUBTOTAL	=	635.00
Processing fee of $130.00 for furnishing the English Translation later than 20 30 mos. from the earliest claimed priority date (37 CFR 1.492(f)).	+	
0 TOTAL FEES ENCLOSED	$	635.00

a. ☐ A check in the amount of $__ to cover the above fees is enclosed.

b. ☒ Please charge Deposit Account No. 16-1150 in the amount of $ 635.00 to cover the above fees. A copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 16-1150. A copy of this sheet is enclosed.

18. ☐ Other instructions

n/a

19. ☒ All correspondence for this application should be mailed to

PENNIE & EDMONDS LLP
1155 AVENUE OF THE AMERICAS
NEW YORK, NEW YORK 10036-2711

20. ☒ All telephone inquiries should be made to (212) 790-2803

Garland T. Stephens		37,242	3/30/01
NAME	SIGNATURE	REGISTRATION NUMBER	DATE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: ☒ Application of: Lindgren et al.
☐ Patent of:

☒ Application No.: TBA
☐ Patent No.:

Group Art Unit: TBA

☒ Filed: March 30, 2001
☐ Issued:

Examiner: TBA

For: APPARATUS FOR ROUTING ASYNCHRONOUS TRAFFIC IN A CIRCUIT SWITCHED NETWORK

Attorney Docket No.: 10806-007-999

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
[37 CFR 1.9(f) and 1.27(c)] - Small Business Concern

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

I hereby declare that I am

☐ the owner of the small business concern identified below:
☒ an official of the small business concern empowered to act in behalf of the concern identified below:
Name of organization Net Insight AB
Address of organization P.O. Box 42093
SE-126 14 Stockholm
Sweden

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 37 CFR 1.9(d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the person employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern and/or there is an obligation under contract or law by the inventor(s) to convey rights to the small business concern with regard to the invention entitled METHODS AND ARRANGEMENT FOR ESTABLISHING COMMUNICATION CHANNELS IN A DTM NETWORK by inventor(s) ~~Mangus Danielsen~~ Lindgren et al described in

☐ the specification filed herewith

☒ application no. TBA filed March 30, 2001
☐ patent no. issued

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

FULL NAME_____
ADDRESS_____

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

FULL NAME_____
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I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. [37 CFR 1.28 (b)]

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, and patent issuing thereon, or any patent to which this verified statement is directed.

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Name of person signing BENGT OLSSON
Title of person ~~other than~~ owner CEO
Address of person signing P.O. Box 42093, SE-126 14 Stockholm, Sweden
Signature [signature] Date May 5, 2001

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

APPARATUS FOR ROUTING ASYNCHRONOUS TRAFFIC IN A CIRCUIT SWITCHED NETWORK

Technical Field of Invention

The present invention refers to an apparatus providing routing of asynchronous traffic in a circuit switched synchronous time division multiplexed network, said apparatus comprising: an interface providing access to a multi-channel bitstream carrying isochronous channels; routing means for providing routing of data packets; and a communication medium interconnecting said interface and said routing means.

Background of the invention

Today, new types of circuit-switched communication networks are being developed for the transfer of information using synchronous time division multiplexed bitstreams. Within this field, a new technology, referred DTM (Dynamic synchronous Transfer Mode), are currently being developed, primarily addressing the problem of providing quality of service to users of real-time, broadband applications.

The structure of a DTM network has been described in, e.g., "The DTM Gigabit Network", Christer Bohm, Per Lindgren, Lars Ramfelt, and Peter Sjödin, Journal of High Speed Networks, 3(2):109-126, 1994, and in "Multi-gigabit networking based on DTM", Lars Gauffin, Lars Håkansson, and Björn Pehrson, Computer networks and ISDN Systems, 24(2):119-139, April 1992.

The basic topology of a DTM network is preferably a bus with two unidirectional, multi-access, multi-channel optical fibers connecting a number of nodes, each node being arranged to serve one or more end users connected thereto. However, the topology may just as well be any other kind of structures e.g. a ring structure or a hub structure.

When transferring asynchronous traffic, such as TCP/IP packets or Ethernet frames, a mechanism for providing routing of such traffic through, e.g., a DTM network is needed. This is typically solved by the provision of routing apparatuses at different locations in the network.

Typically, such a routing apparatus comprises one or more interfaces providing access to respective multi-channel bitstreams carrying isochronous channels, a routing processor for providing routing of data packets, and a communication bus interconnecting said interfaces and said routing processor.

A problem in this type of routing apparatus is that the capacity demand placed upon on the routing processor, as well as the transfer capacity demand placed upon the communication bus, becomes high as several interfaces needs access to the function provided by the one routing processor. When these demands exceed the available capacity, blocking will occur, resulting in delays or even loss of data.

An object of the invention is therefore to provide a routing apparatus designed to reduce the risk of lack of capacity, thereby limiting the occurrence of blocking or loss of data in relation to the routing processor.

Summary of the invention

The above mentioned and other objects of the invention are achieved by the invention as defined in the accompanying claims.

According to an aspect of the invention, there is provided and apparatus of the kind mentioned in the introduction, wherein said interface comprises means for deriving data packets received in at least one of said isochronous channels, means for transmitting only header portions of said data packets to said routing means via said communication medium, means for temporarily storing at least body portions of said data packets, and means

for forwarding said data packets in accordance with routing instructions received from said routing means.

The invention is thus based upon the idea of limiting the amount of data transferred on said communication medium, and consequently handled by the routing processor, by only transmitting the header portion of each data packet from said interface to said routing processor, while storing the data packet, or at least the remaining part of the data packet, at said interface. Thus, the communication medium and the routing processor do not have to handle the entire data packet, but merely a small portion thereof. Typically, in many applications the only portion of the data packet that actually has to be transmitted to the routing processor will be the destination address of the data packet, even though the invention is not limited thereto.

An advantage of the invention is that a lesser amount of data is transmitted over said communication medium, which typically is a processor bus, thereby reducing the risk of transfer capacity shortage at the communication bus. Another advantage of the invention is that the routing processor is not required to store an entire data packet, but merely needs to handle a header portion thereof. Furthermore, if the step of deriving or extracting the destination address, or other desired information, from the data packet is performed at said interface, the routing processor is relieved from the burden of extracting such information, thereby further reducing the need for processing capacity at the routing processor.

Event though the invention provides a significant advantage with reference to the situation wherein one interface is connected to the routing processor, the advantage is of course magnified in a situation wherein several interfaces are connected to access one or more routing processor.

According to a preferred embodiment of the invention, said interface comprises selecting means for determining if a header portion of a data packet is to be sent to said routing means, and wherein said means for transmitting only header portions of said data packets to said routing means are arranged to control the transmission of header portions according to decision made by said selecting means. Preferably, said selecting means comprises a table designating destination addresses of data packets for which the header portions thereof are not to be transmitted to said routing means.

Typically, in such an embodiment, only header portions of data packets that actually require routing by the routing processor are transmitted over the communication medium to the routing processor. However, header portions of data packets that are to be discarded at said interface (i.e. that are not to be routed at all), that are to be transmitted using another channel accessed by said interface, and/or that are to by bypassed (i.e. transmitted in the same channel as they were received in at said interface) are not directed to the routing processor. Instead, the decision on how to handle such data packets is performed locally at said interface. This will of course further reduce the capacity demand placed upon the routing processor as well as the communication medium.

Preferably, said selecting means will be continuously updated with routing information provided by said routing means, said selecting means thereby receiving information as to which destination addressed that actually does not required data packets, or header portions thereof, to be transmitted to the routing processor.

Furthermore, the features defining this embodiment of the invention may actually be seen as defining a novel invention as such. In other words, the solution of performing local routing decisions at said interface without involving the routing processor, based upon information

continuously provided and updated by the routing processor, may, per se, be regarded as an inventive idea.

Generally, all channels of said multi-channel bitstream need not be received and processed by said interface, while some channels may simply be bypassed at said interface. Therefore, said interface will typically comprise means for determining which channels of said multi-channel bitstream that are to be received by said interface and that contain data packets that are to be routed by said apparatus.

As the invention refers to routing in relation to a multi-channel bitstream carrying isochronous channels, the aspect of using the invention in a so-called DTM (Dynamic synchronous Transfer Mode) network forms a preferred embodiment.

As understood by those skilled in the art, a "header portion" according to the invention need not actually reside at the head end of a data packet, nor is it necessarily the destination address of the data packet that forms the essential part thereof. In fact, the actual location of a "header portion" according to the invention will be given by the protocol of interest. Similarly, the kind and/or amount of information that shall be transmitted to the routing processor according to the invention will depend upon, for example, the type of routing mechanism used, the type of network, and so on. For example, in some cases a source address or a channel identifier (physical or virtual) may be used instead of a destination address as basis for routing. Consequently, the invention is not limited to a specific kind of header portion.

The above mentioned and other aspects, advantageous and features of the invention will be more fully understood from the accompanying claims and from the following detailed description of exemplifying embodiments thereof.

Brief Description of the Drawings

Exemplifying embodiments of the invention will now be described with reference to the accompanying drawings, wherein:

Fig. 1 schematically shows an example of the structure of a bitstream in a circuit switched time division multiplexed network operating according to a DTM protocol;

Fig. 2 schematically illustrates transfer of asynchronous traffic in one of the isochronous channels carried by the bitstream shown in Fig. 1;

Fig. 3 schematically shows an exemplifying embodiment of an apparatus according to the invention; and

Fig. 4 schematically shows another exemplifying embodiment of an apparatus according to the invention.

Detailed Description of an Exemplifying Embodiments

An example of the structure of a multi-channel multi-access bitstream B in a circuit switched time division multiplexed network operating according to a DTM protocol will now be described with reference to Fig. 1.

As shown in Fig. 1, the bitstream B is divided into recurrent, essentially fixed sized frames, wherein the start of each frame is defined by a frame synchronization time slot F. Each frame will have a duration of 125 μs.

Each frame is further divided into a plurality of fixed sized, typically 64 bit, time slots. When using said frame length of 125 μs, a time slot size of 64 bits, and a bit rate of 2Gbps, the total number of time slots within each frame will be approximately 3900.

The time slots are divided into control slots C1, C2, C3, and C4, and data slots D1, D2, D3, and D4. The control slots are used for control signaling between the nodes of the network, whereas the data slots are used for the transfer of payload data. Each node connected to the bitstream B is typically allocated at least one control slot, i.e. each node will have write access to at least

one control slot. Furthermore, write access to data slots are distributed among the nodes connected to the bitstream. As an example, a first node (connected to the bitstream B) will have access to a control slot C1 and a set of data slots D1 within each DTM frame of the bitstream, another node (also connected to the bitstream) will have access to a control slot C2 and a set of data slots D2 within each DTM frame of the bitstream, and so on. The set of slots allocated to a node as control slot(s) and/or data slot(s) occupy the same respective slot positions within each DTM frame of the bitstream. Hence, in the example, said first node's control slot C1 will occupy the second time slot within each DTM frame of the bitstream.

During network operation, each node may increase or decrease its access to control slots and/or data slots, thereby re-distributing the access to control slots and/or data slots among the nodes. For example, a node having a low transfer capacity demand may give away its access to data slots to a node having a higher transfer capacity demand. Furthermore, the slots allocated to a node need not be consecutive slots, but may reside anywhere within the frame.

Also, note that each DTM frame typically begins with said frame synchronization time slot, defining the frame rate on the bitstream, and ends with one or more guard band time slots G.

In Fig. 1 at (c), it is furthermore assumed that said second node, having access to its control slot C2 and its range of data slots D2, has established four channels CH1, CH2, CH3, and CH4 on the bitstream. As shown, each channel is allocated a respective set of slots. In the example, the transfer capacity of channel CH1 is larger than the transfer capacity of channel 2, since the number of time slots allocated to channel CH1 is larger than the number of time slots allocated to channel CH2. The time slots allocated to a channel occupy

the same time slot positions within each recurrent DTM frame of the bitstream.

An example of the transfer of asynchronous traffic in one of the isochronous channels carried by the bitstream B shown in Fig. 1 will now be described with reference to Fig. 2. In Fig. 2, it is assumed that the channel CH3 shown in Fig. 1 is established to carry asynchronous traffic in the form of sequentially transmitted variable size data packets, which for example may be TCP/IP packets or Ethernet frames. (Note that Fig. 2 only shows the sequence of sequential time slots transmitted within the channel CH3). Since Fig. 1 schematically indicates that channel CH3 comprises seven time slots within each DTM frame on bitstream B, the first seven time slots transmitted in the channel CH3, i.e. the first seven time slots in Fig. 2, will be transmitted in one DTM frame, the next seven time slots will be transmitted in the next DTM frame, and so on.

Fig. 2 shows data packets transmitted in channel CH3. Each data packet is encapsulated according to a predefined encapsulation protocol. It is assumed that the encapsulation protocol defines that each data packet shall be divided into 64 bit data blocks (corresponding to the size of a time slot), that a start_of_packet slot S is to be added to the start of each data packet, and that an end_of_packet slot E is to be added to the end of each data packet, thereby forming encapsulated data packets P1, P2, and P3. In case of gaps between packets, the bitstream is provided with so called idle slots, identifying said gaps as not providing valid data.

An exemplifying embodiment of an apparatus according to the invention will now be described with reference to Fig. 3, wherein the apparatus 10 comprises an interface 12, a processor bus 24, and a router processor 26. The interface 12 provides read/write access to a multi-channel bitstream, for example of the kind described above with reference to Figs. 1a-1c. The processor bus 24

provides a shared medium for communication between the router processor, the interface 26, and other interfaces (not shown) of the apparatus 10. The routing processor 26 provides routing of data packets received at the interfaces of the apparatus.

The interface 12 in turn comprises a network medium access unit 14, a time slot counter 16, an input direct memory access unit 18, a memory 20, a data packet processor 22, and an output direct memory access unit 32.

In operation, the medium access unit receives a continuous stream of data bits from the bitstream 5. Based upon frame synchronization information provided in the bitstream, the time slot counter 16 of the medium access unit 14 will count the time slot position currently being received on bitstream 5. This count is then provided to the input direct memory access 18 that will designate a memory location of memory 20, whereby the time slot data received on bitstream 5 is written into the memory location designated by the input direct memory unit. The input direct memory unit will then see to that a data packet received in a channel defined on bitstream 5 is stored at a selected memory location of memory 20.

Typically, each received data packet is encapsulated according to a predefined protocol and will received as a set of consecutive sequential 64 bit data blocks. The number of blocks encapsulating a data packet will depend on the size of the actual data packet.

As a data packet is being stored in memory 20, the data packet processor 22 will derive a header portion thereof, said header portion containing at least the destination address of said data packet, and will then transmit said header portion to the routing processor 26 via the processor bus 24. Note that, according to the invention, the data packet processor 22 does not transmit the entire data packet to the routing processor 26, but

only a header portion thereof, thereby decreasing the capacity demand placed upon the internal processor bus.

The router processor typically has access to a routing table 28 and a data packet buffer 30, the latter being used when the operation of the routing processor requires temporary storage of a data packet or a portion thereof at the routing processor.

Having received a data packet header from the data packet processor 22, the router processor will derive the destination address thereof an access the routing table 28 for determining which output interface, port, and channel thereof to use when transmitting the data packet associated with said header. Having determined so, the routing processor will send a message to the data packet processor 22 via the processor bus, instructing said data packet processor 22 on which interface and channel that the associated data packet is to be transmitted via.

Having received said message from the routing processor 26, the data packet processor 22 will act according to the instruction provided therein. Typically this will involve one of the following measures: a) reading out the body of the data packet from the memory 20 and transmitting it to another interface (not shown) connected to the processor bus; b) instructing the output direct memory access unit 32 to transmit the data packet into a designated channel on bitstream 5; and c) discarding said data packet.

Having performed such measures, the data packet processor 22 will inform the input direct memory access unit 18 that the processing of said data packet is completed and that the input direct memory access unit 32 is free to use the memory location occupied by said data packet for storing of new data packets.

As is understood, the output direct memory access unit 32 will see to that data packets are read from the memory 20 and written into the appropriate channels on bitstream 5 in accordance with instructions received from

the data packet processor 22 and in accordance with the time slot count provided by the counter 14.

Another embodiment of an apparatus according to the invention will now be described with reference to Fig. 4. In the apparatus 11 shown in Fig. 4, the only difference compared to the embodiment shown in Fig. 3 is that, in Fig. 4, the data packet processor 22 is provided with a cache routing table 34. The cache routing table contains a list of destination addresses that the routing processor 26 has previously determined shall be routed only to one or more channels on bitstream 5 or shall not be routed at all, i.e. shall be discarded or bypassed at the interface 12.

Consequently, when a received data packet is being stored in memory 20, the data packet processor will compare the destination address of the header thereof against the destination addresses contained in the cache routing table 34. If a match is found, the header portion of the data packet will not be transmitted to the routing processor 26. Instead, the data packet is discarded, bypassed, or routed to another channel on bitstream 5 based upon the information provided by said cache routing table 34, thereby further reducing the processing load on the routing processor 26 and the transfer capacity demand of the processor bus 24. In such an embodiment, any routing performed by the routing processor 26 may cause the routing table to instruct the data packet processor to update the cache routing table.

Note, that if the channel from which said data packet was received does not terminate at the apparatus 11 but instead/also continuos to one or more other downstream nodes, the data packet will be "bypassed", i.e. forwarded to downstream nodes in the same channel as it was received.

Even though the invention has been described above with reference to exemplifying embodiments thereof, these are not to be considered as limiting the scope of the

invention. Consequently, as understood by those skilled in the art, different modifications, combinations and alterations may be made within the scope of the invention, which is defined by the accompanying claims.

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CLAIMS

1. An apparatus providing routing of asynchronous traffic in a circuit switched synchronous time division multiplexed network, said apparatus comprising:

an interface (12) providing access to a multi-channel bitstream carrying isochronous channels;

routing means (26) for providing routing of data packets; and

a communication medium (24) interconnecting said interface and said routing means,

wherein said interface (12) comprises means (18) for deriving data packets received in at least one of said isochronous channels, means (22) for transmitting only header portions of said data packets to said routing means via said communication medium (24), means (20) for temporarily storing at least body portions of said data packets, and means (22, 32) for forwarding said data packets in accordance with routing instructions received from said routing means.

2. An apparatus as claimed in claim 1, wherein said interface (12) comprises selecting means (43) for determining if a header portion of a data packet is to be sent to said routing means (26), and wherein said means (22) for transmitting only header portions of said data packets to said routing means (26) are arranged to control the transmission of header portions according to decision made by said selecting means.

3. An apparatus as claimed in claim 2, wherein said selecting means (43) comprises a table designating destination addresses of data packets for which the header portions thereof are not to be transmitted to said routing means.

4. An apparatus as claimed in claim 2 or 3, wherein said selecting means (43) comprises a table designating destination addresses of data packets that are to be discarded at said interface.

5. An apparatus as claimed in claim 2, 3, or 4, wherein said selecting means (43) comprises a table designating destination addresses of data packets that are to be transmitted to one or more of the isochronous channels of said multi-channel bitstream that is accessed by said interface.

6. An apparatus as claimed in claim 2, 3, 4, or 5, wherein said selecting means (43) comprises a cache memory that is continuously updated with routing information provided by said routing means.

7. An apparatus as claimed in any one of the preceding claims, wherein said forwarding of a data packet in accordance with routing instructions received from said routing means (26) comprises at least one measure in the group consisting of: forwarding said data packet to another interface connected to said communication medium (24); forwarding said data packet to said routing processor (26); forwarding said data packet to a channel of said multi-channel bitstream; and discarding said data packet.

8. An apparatus as claimed in any one of the preceding claims, wherein said interface (12) comprises means (22) for determining which channels of said multi-channel bitstream that are to be received by said interface (12) and that contain data packets that are to be routed by said apparatus.

9. An apparatus as claimed in any one of the preceding claims, wherein said interface (12) comprises means

for bypassing channels of said multi-channel bitstream that are not to be received by said apparatus.

10. An apparatus as claimed in any one of the preceding claims, wherein said data packets, when transmitted within said channels, are encapsulated according to a predefined encapsulation protocol.

11. An apparatus as claimed in any one of the preceding claims, wherein said communication medium (24) is a shared medium connecting said interface and one or more other interfaces with said routing means.

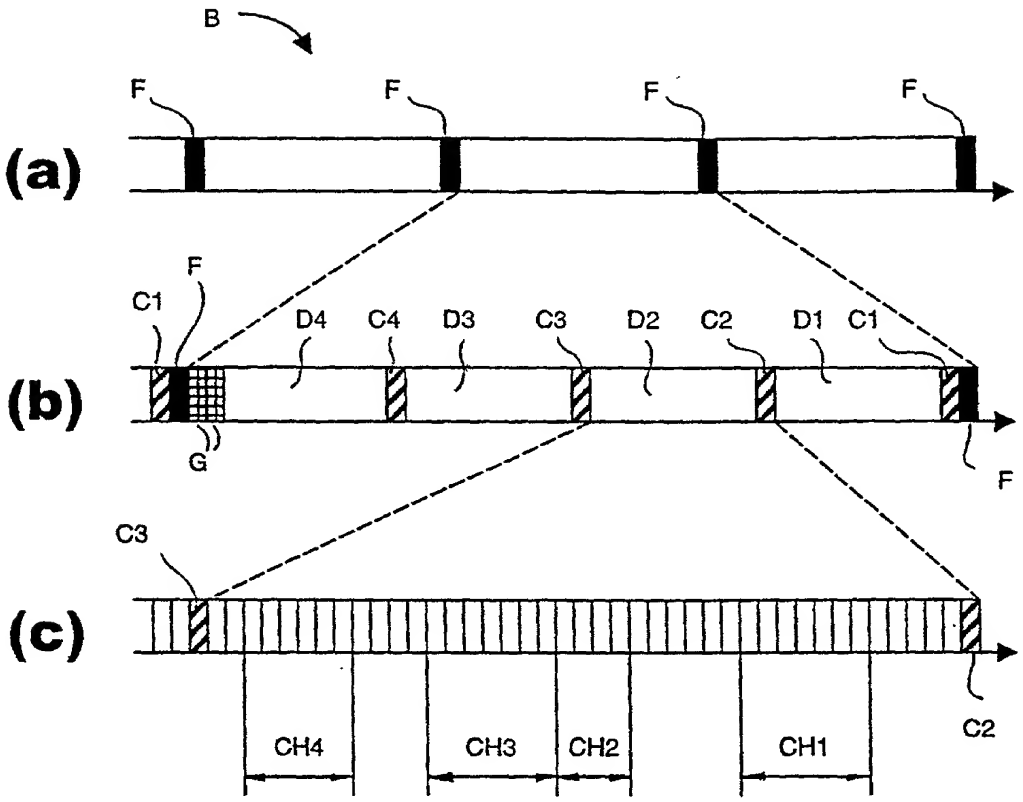
12. An apparatus as claimed in any one of the preceding claims, wherein said medium (24) is a communication bus interconnecting said interface and said routing means.

13. An apparatus as claimed in any one of the preceding claims, wherein said routing means (26) are arranged to also perform routing in relation to data packets received at one or more other interfaces of the apparatus.

14. An apparatus as claimed in claim 13, wherein said communication medium (24) is arranged to interconnect said one or more other interfaces and said routing routing means (26).

15. An apparatus as claimed in any one of the preceding claims, wherein said network is operating according to a Dynamic synchronous Transfer Mode (DTM) protocol.

16. An apparatus as claimed in any one of the preceding claims, wherein said bitstream is a multi-access bitstream.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C3
(c)
C2
CH4
CH3
CH2
CH1

Fig. 1

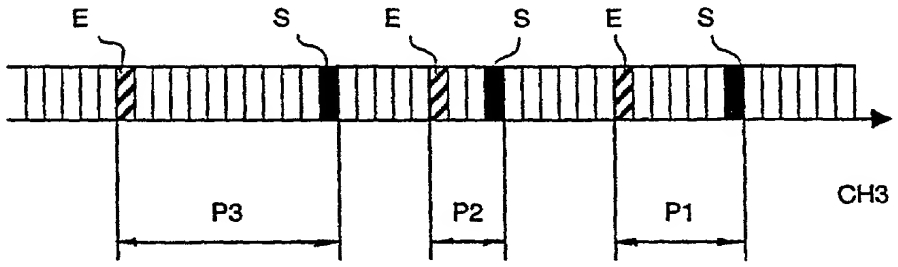
E
S
E
S
E
S
P3
P2
P1
CH3

Fig. 2

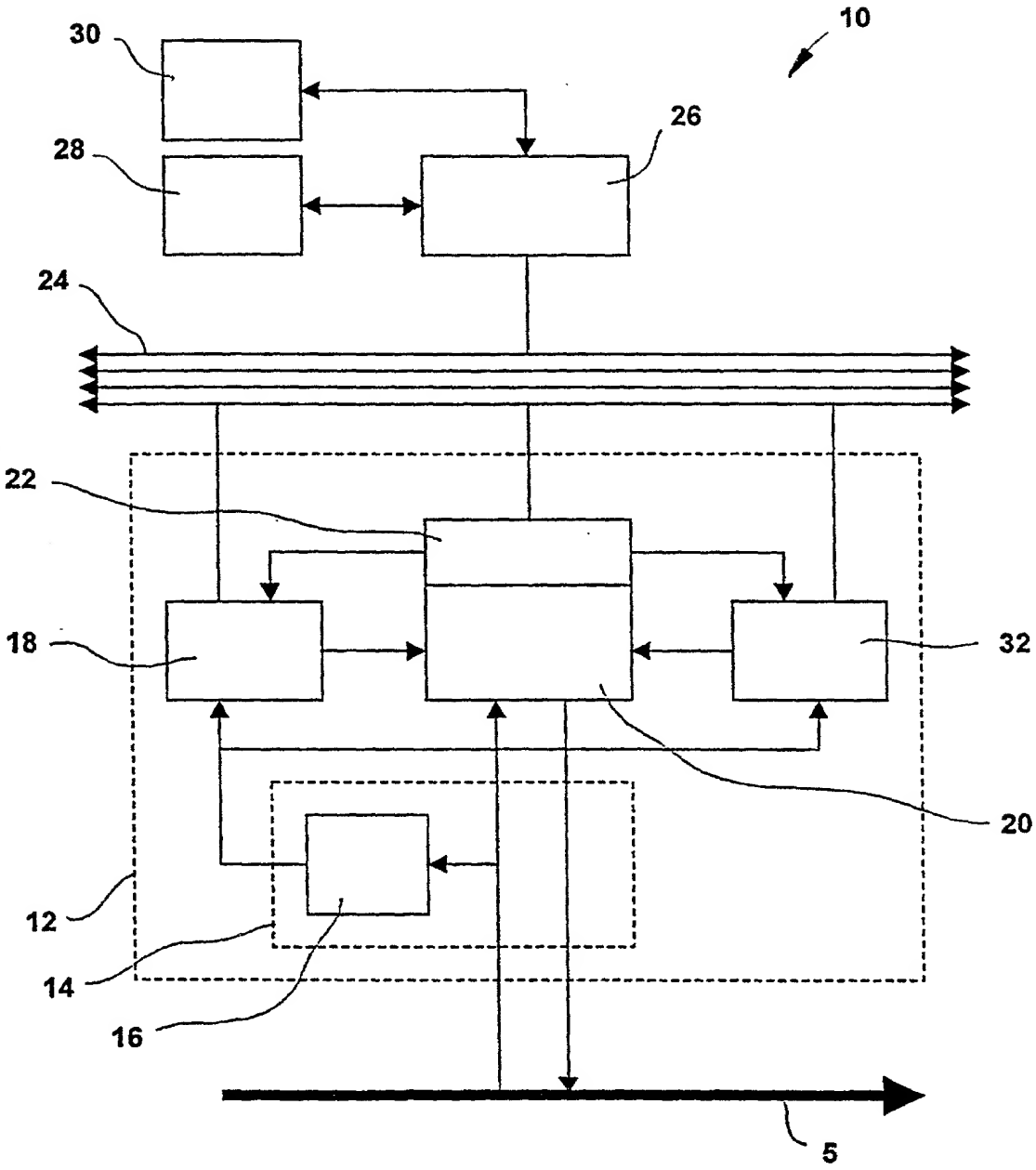

Fig. 3

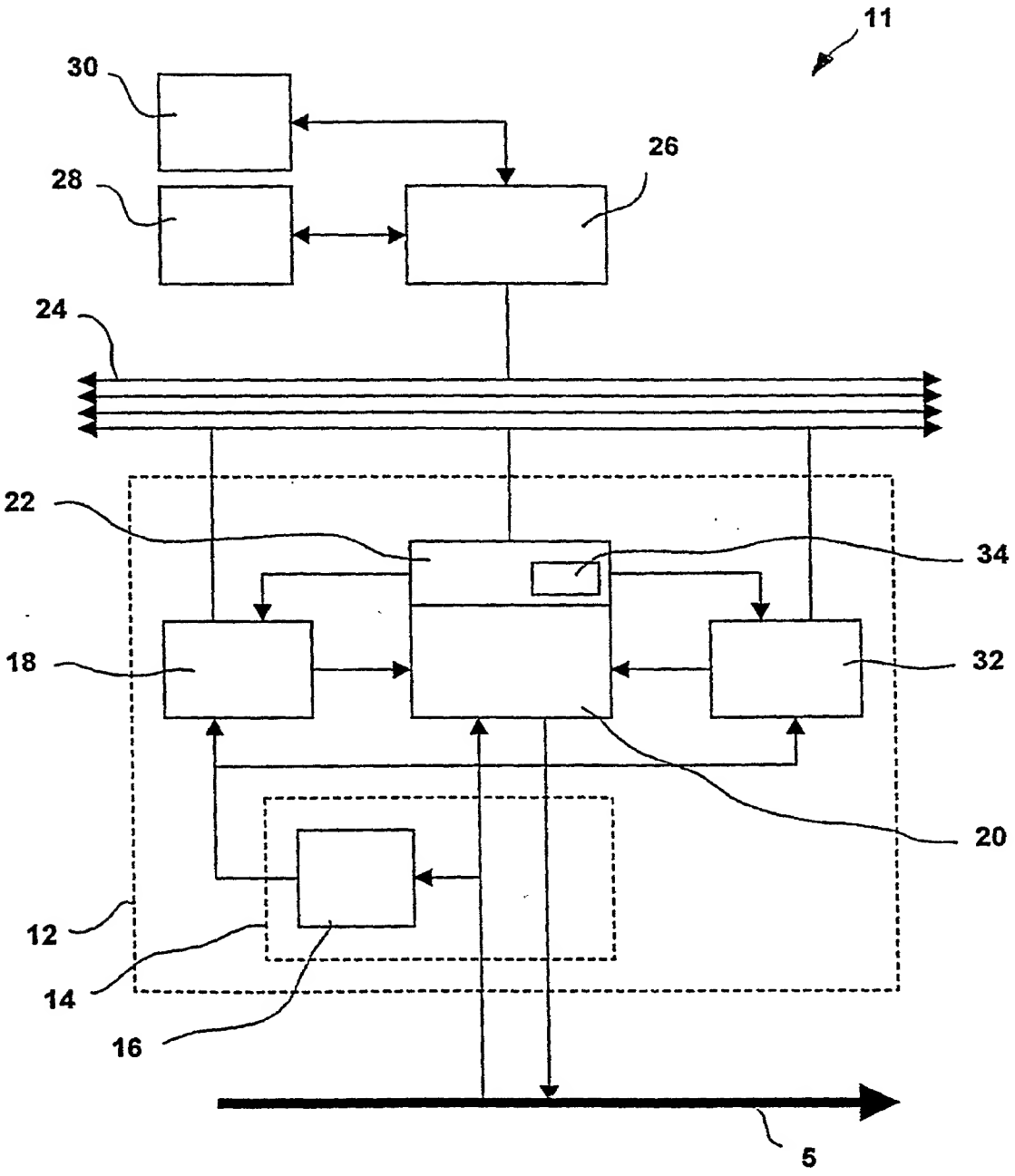

Fig. 4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: Lindgren et al.

Application No.: TBA

Group Art Unit: TBA

Filed: March 30, 2001

Examiner: TBA

For: APPARATUS FOR ROUTING ASYNCHRONOUS TRAFFIC IN A CIRCUIT SWITCHED NETWORK

Attorney Docket No.: 10806-007

POWER OF ATTORNEY BY ASSIGNEE
AND EXCLUSION OF INVENTOR(S) UNDER 37 C.F.R. 3.71

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

The undersigned assignee of the entire interest in the above-identified subject application hereby appoints: S. Leslie Misrock (Reg. No. 18872), Berj A. Terzian (Reg. No. 20060), David Weild, III (Reg. No. 21094), Jonathan A. Marshall (Reg. No. 24614), Barry D. Rein (Reg. No. 22411), Stanton T. Lawrence, III (Reg. No. 25736), Charles E. McKenney (Reg. No. 22795), Philip T. Shannon (Reg. No. 24278), Francis E. Morris (Reg. No. 24615), Charles E. Miller (Reg. No. 24576), Gidon D. Stern (Reg. No. 27469), John J. Lauter, Jr. (Reg. No. 27814), Brian M. Poissant (Reg. No. 28462), Brian D. Coggio (Reg. No. 27624), Rory J. Radding (Reg. No. 28749), Stephen J. Harbulak (Reg. No. 29166), Donald J. Goodell (Reg. No. 19766), James N. Palik (Reg. No. 25510), Thomas E. Friebel (Reg. No. 29258), Laura A. Coruzzi (Reg. No. 30742), Jennifer Gordon (Reg. No. 30753), Geraldine F. Baldwin (Reg. No. 31232), Victor N. Balancia (Reg. No. 31231), Samuel B. Abrams (Reg. No. 30605), Steven I. Wallach (Reg. No. 35402), Marcia H. Sundeen (Reg. No. 30893), Paul J. Zegger (Reg. No. 33821), Edmond R. Bannon (Reg. No. 32110), Bruce J. Barker (Reg. No. 33291), Adriane M. Antler (Reg. No. 32605), Thomas G. Rowan (Reg. No. 34419), James G. Markey (Reg. No. 31636), Thomas D. Kohler (Reg. No. 32797), Scott D. Stimpson (Reg. No. 33607), Gary S. Williams (Reg. No. 31066), Ann L. Gisolfi (Reg. No. 31956), Todd A.

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[ ] An assignment of the entire interest in the above-identified subject application was recorded on _____ at reel/frame _/_____.

[ ] An assignment of the entire interest in the above-identified subject application is submitted herewith for recording.

[x] A copy of an assignment of the entire interest in the above-identified subject application is submitted herewith. The assignment will be duly recorded.

Please direct all correspondence for this application to customer no. 20583.

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Date: May 5, 2001

DECLARATION FOR NON-PROVISIONAL PATENT APPLICATION*

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below at 201 et seq. beneath my name.

I believe I am the original, first and sole inventor if only one name is listed at 201 below, or an original, first and joint inventor if plural names are listed at 201 et seq. below, of the subject matter which is claimed and for which a patent is sought on the invention entitled

APPARATUS FOR ROUTING ASYNCHRONOUS TRAFFIC IN A CIRCUIT SWITCHED NETWORK

and for which a patent application:
☐ is attached hereto and includes amendment(s) filed on *(if applicable)*
☒ was filed in the United States on March 30, 2001 as Application No. TBA
☒ was filed as PCT international Application No. PCT/SE99/01798 on October 7, 1999

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

EARLIEST FOREIGN APPLICATION(S), IF ANY, FILED PRIOR TO THE FILING DATE OF THE APPLICATION			
APPLICATION NUMBER	COUNTRY	DATE OF FILING (day, month, year)	PRIORITY CLAIMED
9803417-6	Sweden	October 7, 1998	YES ☒ NO ☐
PCT/SE99/01798	PCT	October 7, 1999	YES ☒ NO ☐
			YES ☐ NO ☐

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below.

PROVISIONAL APPLICATION NUMBER	FILING DATE

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information known to me which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

NON-PROVISIONAL APPLICATION SERIAL NO.	FILING DATE	STATUS		
		PATENTED	PENDING	ABANDONED

* for use only when the application is assigned to a company, partnership or other organization.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

1-00 2 0 1

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2-00 2 0 2

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3-00 2 0 3

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	SIGNATURE OF INVENTOR 203: Bengt J. Olsson		DATE: May 3, 2001	